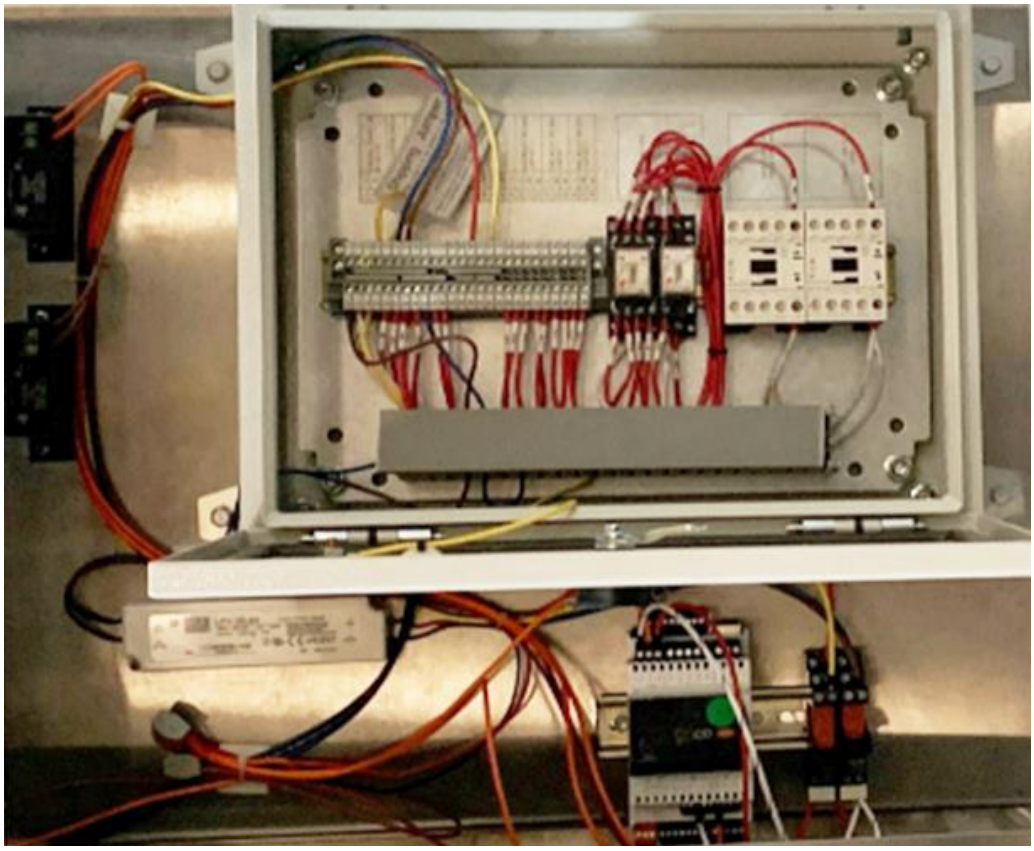
NORTH AMERICAN KITCHEN SOLUTIONS INCORPORATED

DEMAND CONTROL VENTILATION V1.03

Installation, Operation, and Maintenance Manual



RECEIVING AND INSPECTION

Upon receiving your equipment, check for any interior or exterior damage. When the truck arrives at your location and the shipment is unloaded, it is **YOUR** responsibility to inspect each and every item for damage **BEFORE** signing the Driver's delivery receipt/Bill of Lading. **DO NOT SIGN until you have thoroughly looked over the equipment**. Once you sign the delivery receipt/Bill of Lading, you relieve the trucking company and North American Kitchen Solutions, Inc. of any and all claims for damaged and/or missing products.

Save these instructions. This document is the property of the owner of the equipment. Leave this document with the owner when installation or service is complete.

WARNING!!

Installation of this equipment should only be performed by a qualified professional.

Please read this manual thoroughly before installing or servicing this equipment.

WARNING

Electrical shock hazard. Can cause equipment damage, personal injury, or death. Service must only be performed by personnel that are knowledgeable in the operation of the equipment being controlled.

DANGER

Always disconnect power before working on or near the product. Lock and tag the disconnect switch or breaker to prevent accidental power up.

CAUTION

It is the responsibility of the installer to make sure both electrical and gas appliances shut down in the event of a fire or in the event of a power loss to the building when the sequence is required by the authority having jurisdiction.

INSTALLATION

The equipment is required to be installed and operated as a pre-engineered product, using the equipment which is identified and explained within this manual. If there are any questions about any items, please call the service department at **1-800-715-1014** for warranty and technical support.

WARNING: IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE AND/OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, INJURY OR DEATH.

PLEASE READ THE INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS BEFORE INSTALLING OR SERVICING THIS EQUIPMENT.

RECEIVING/STORAGE

Once equipment is received, check for both obvious and hidden damage. If damage is found, record all necessary information on the bill of lading and file a claim with the final carrier. Check to be sure that all parts of the shipment, including accessories, are accounted for.

If a system must be stored prior to installation it must be protected. Indoor storage is recommended. For outdoor storage, cover the system and accessories with a tarp to keep them clean, dry, and protected from UV (Ultraviolet) radiation damage.

Improper storage which results in damage to the unit will void the warranty.

Site Preparation

1. Make sure that clearance is provided around the installation site to connect Sensors both on the hood and in the room. Note Room Temp/Humidity Sensor to be no closer than 10'-0" to the hood system.

2. When possible, locate unit so that there is at least 24" of clearance in front of the touchscreen to allow adjustment.

3. Review the electrical and project plans and drawings for the job.

4. Determine the exact location of the hood – consult your project plans and drawings. The Hood Temperature Sensors should then be wired back to the Terminal Blocks and should be inspected to verify that there are no interferences which will prevent proper installation.

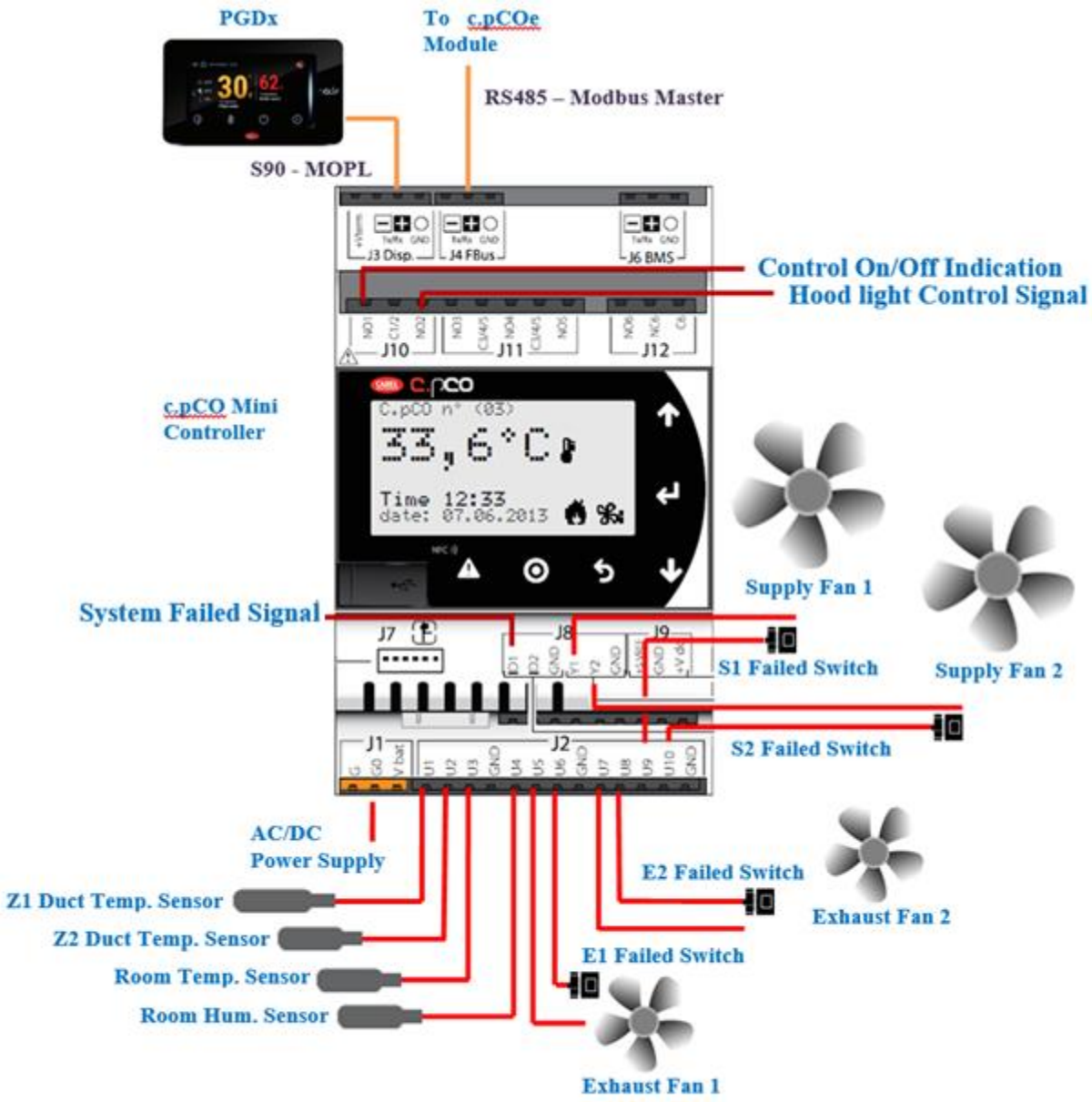
Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the latest edition of the National Fire Protection Agency Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations (NFPA 96). If installing in Canada, follow the Canadian Electrical Code (CEC) and ULC-S650.

System Layout

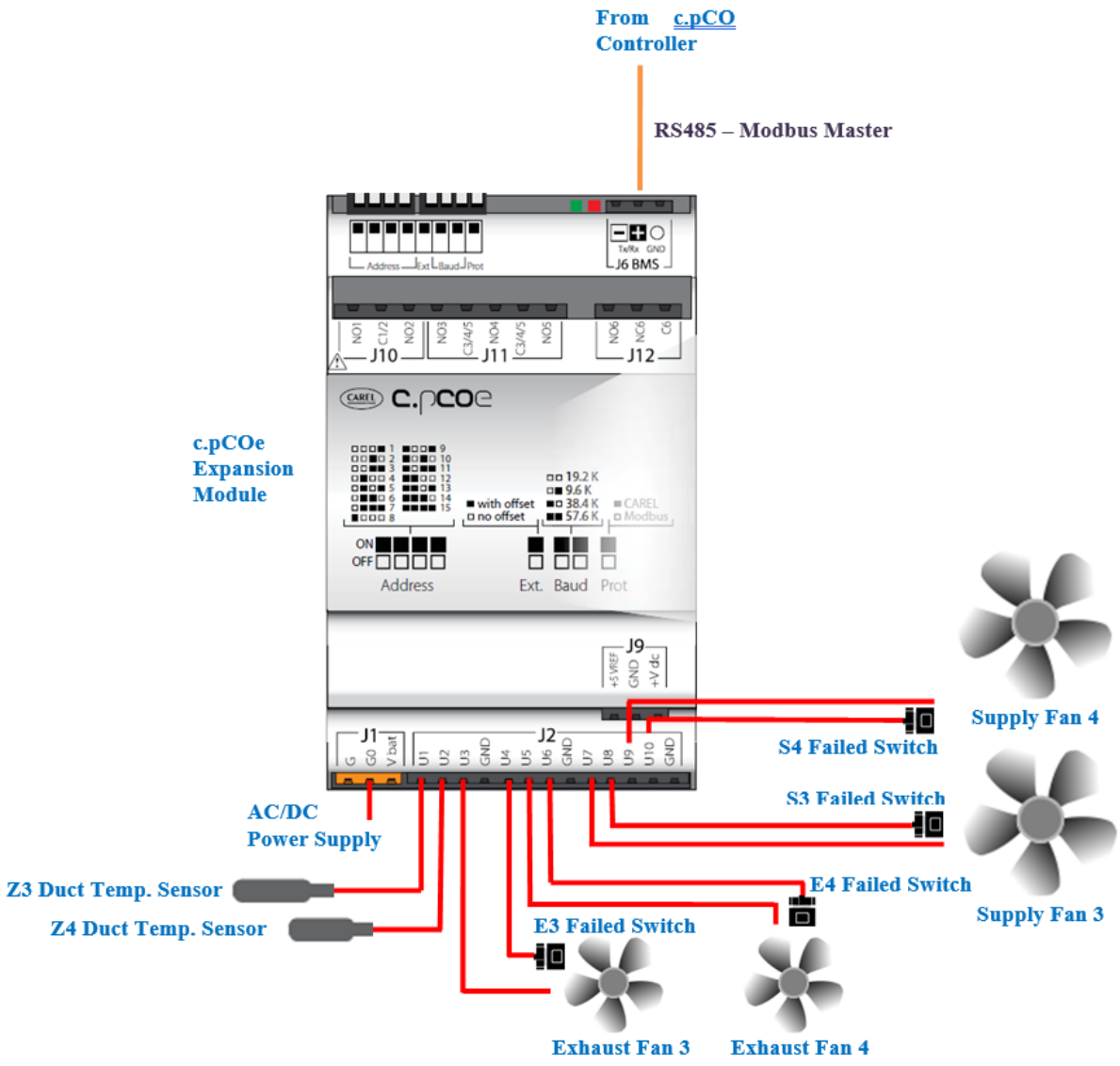
The picture on the following page shows how the Controller is connected to the PGDx, field sensors, and devices.

There will be ten (10) modeled selections to choose from to configure the system. The selection is based on the number of zones and the number of fans in each system.

Each zone has a Duct temperature sensor. Its signal is used to control the Exhaust and the Supply fan speed within that zone.



System Layout Main Controller



System Layout (Expansion Module)

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Controller IO Table

CONTROLLER'S IO MAPPING				
Main Controller (c.pCO mini)				
Field Device	**IO Type**	**Channel #**	**Signal Range**	**Process Range**
Z1 Duct Temp. Sens.	Analog Input	U1	NTC	95 - 140 ˚F
Z2 Duct Temp. Sens.	Analog Input	U2	NTC	95 - 140 ˚F
Room Temp. Sens.	Analog Input	U3	NTC	65 – 115 ˚F
Room Hum. Sens.	Analog Input	U4	0-1 Vdc	0 - 100 %
Exhaust 1	Analog Output	U5	0-10 Vdc	CFM
Exhst 1 Failed Switch	Digital Input	U6	On/Off	True/False
Exhaust 2	Analog Output	U7	0-10 Vdc	CFM
Exhst 2 Failed Switch	Digital Input	U8	On/Off	True/False
Supply 1	Analog Output	Y1	0-10 Vdc	10 - 100 % Exhst Fan
Supply 2	Analog Output	Y2	0-10 Vdc	10 - 100 % Exhst Fan
Spply 1 Failed Switch	Digital Input	U9	On/Off	True/False
Spply 2 Failed Switch	Digital Input	U10	On/Off	True/False
System Failed Signal	Digital Input	ID1	On/Off	True/False
System On/Off Signal	Digital Output	NO1	0/5 Vdc	Off/On
Hood Light Control	Digital Output	NO2	0/24 Vdc	Off/On
Expansion Module (c.pCOe)				
Field Device	**IO Type**	**Channel #**	**Signal Range**	**Process Range**
Z3 Duct Temp. Sens.	Analog Input	U1	NTC	95 - 140 ˚F
Z4 Duct Temp. Sens.	Analog Input	U2	NTC	95 - 140 ˚F
Exhaust 3	Analog Output	U3	0-10 Vdc	CFM
Exhst 3 Failed Switch	Digital Input	U4	On/Off	True/False
Exhaust 4	Analog Output	U5	0-10 Vdc	CFM
Exhst 4 Failed Switch	Digital Input	U6	On/Off	True/False
Supply 3	Analog Output	U7	0-10 Vdc	10 - 100 % Exhst Fan
Spply 3 Failed Switch	Digital Input	U8	On/Off	True/False
Supply 4	Analog Output	U9	0-10 Vdc	10 - 100 % Exhst Fan
Spply 4 Failed Switch	Digital Input	U10	On/Off	True/False

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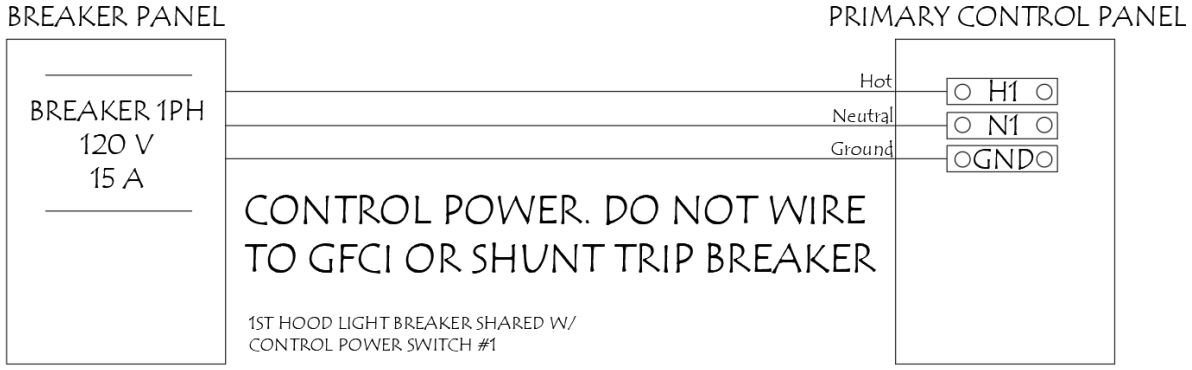
Electrical Connections

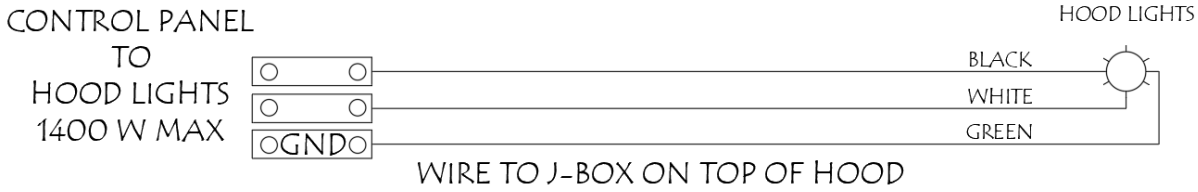
Power for Controls

115 VAC, power to controls (Terminal 1, 2, and GND)



Power for Lights

115 VAC, power to controls (Terminal 10, 12, and GND)



Connection for Room Temperature/Humidity Sensor

Low Voltage 18/5 wire (Terminals +VDC, U3, U4, GND)

NOTE: WIRE TO CONTROL BOARD. INSTALL SENSOR IN ROOM AWAY FROM HEAT SOURCES. DO NOT INSTALL SENSOR ON CEILING GRID

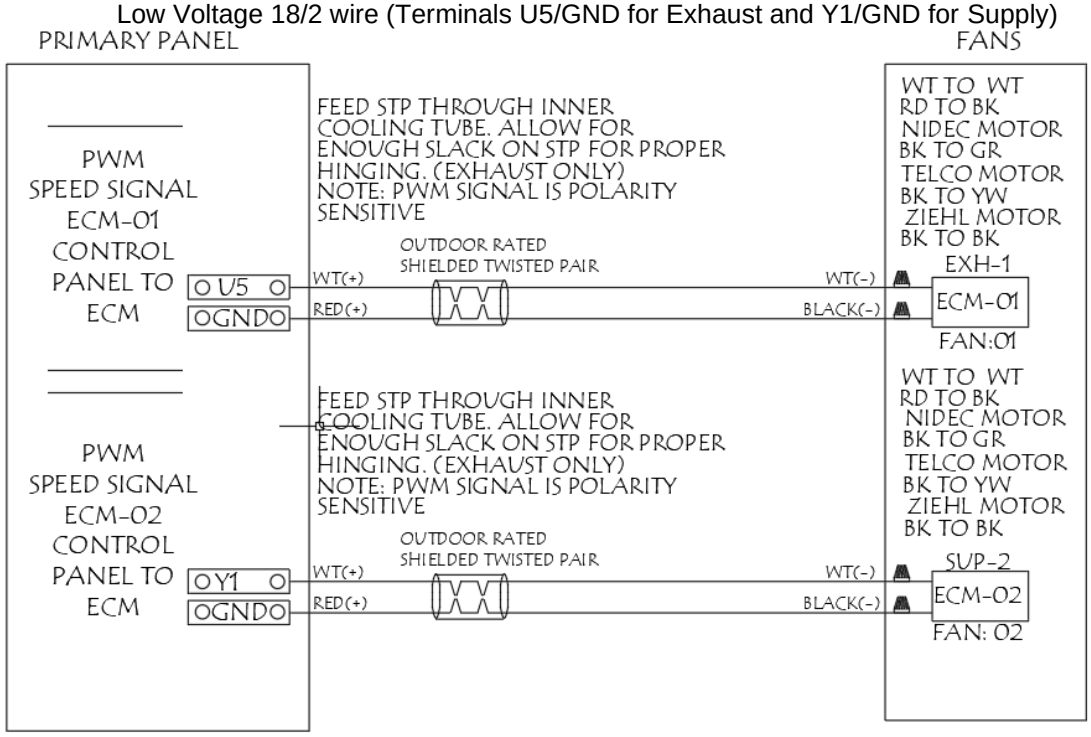
Signal for Duct Thermostat

115 VAC signal power from Duct Thermostat (Pre-Mounted on roof of hood)

Wire to Terminals 3 and 8

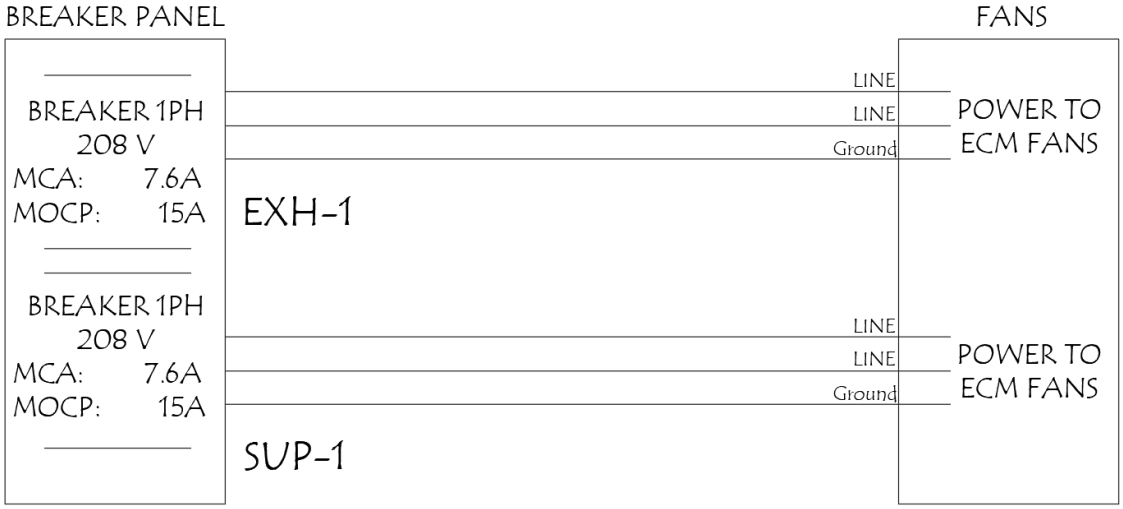
Connection for Fan Controls

Low Voltage 18/2 wire (Terminals U5/GND for Exhaust and Y1/GND for Supply)



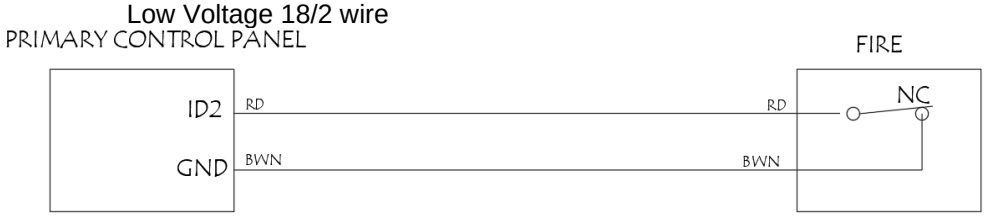
Power for EC Fans (if provided)

115 VAC (If unit is provided with control contactors, the controls will route to L1, L2, and GND and then from T1, T2, and Ground up to fan)



Signal for Fire System

Low Voltage 18/2 wire



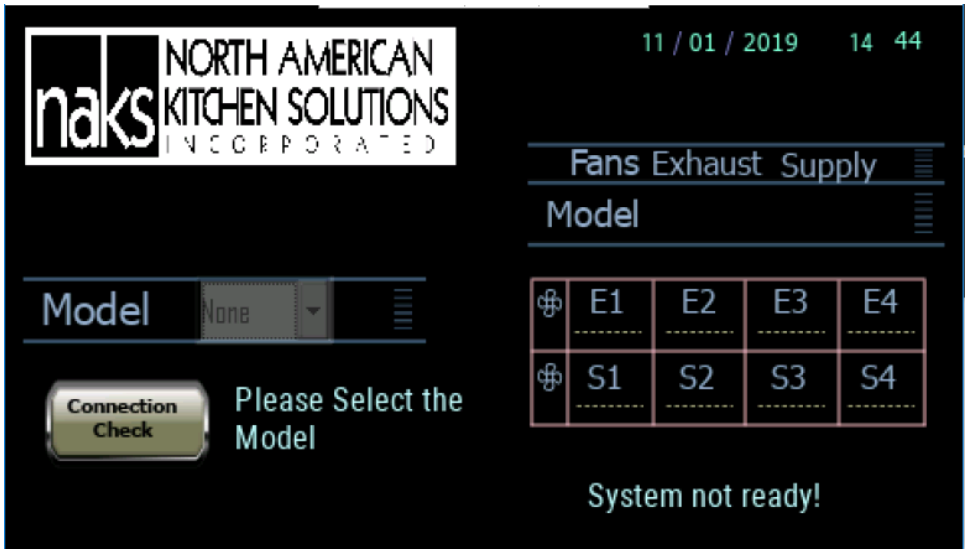
Sequence of Operation

First-time Startup Configuration

When the System is started for the first time, a configuration screen will be shown to allow the service personel to select the system model. The table with the available Zones on the right will be shown based on the selected model.

The user can then press the connection check button, and a signal will be sent out to speed up the fans. The controller reads all of the current feedback sensors and updates the passed/failed results in the Table. During this testing process, a “Checking in Progress” message will be displayed.

The “System not ready!” will be changed to “System ready!” once all the tests have been passed. The user then can select the correct fan models for the system. The Enter button will also be shown to let the user go to the Homepage.



System Configuration Page

Startup Mode

At startup, all the supply fans and exhaust fans will be set to 15% and run for 30 seconds. Once the timer expires, the fan speed of each zone is determined by the duct temperature of that zone with the minimum cutoff speed set to 10%.

The following Modes are applied to all the available zones of the system:

Normal Mode

In the normal operation mode, all the exhaust fans are set to run from 10–100%. This is proportional to 95-140˚F of duct temperature.

- The supply fan speed is set in percentage of the exhaust fan with the minimum of 10%. The supply fan will not start if the system detects there is an exhaust fan failure within that zone.

- When there is no demand, all fans will be at idle speed of 10%.
- When the controller is in the Off mode, the system continues to monitor the Duct temperature and will set the controller back to On if the temperature is equal to or greater than 150 ˚F.
- The Hood light can be controlled by either tapping the light switch from the HMI or by switching the controller On/Off.

Demand Mode

When the Demand button is pressed, the exhaust fan will speed up to 100%, and the supply fan will default to 40%. The system will continue to run in this mode for 10 minutes and revert back to the Normal mode which is when the duct thermostat sets the fan speed.

Warning and Alarm Mode

An LED Bar and Homepage displayed texts of the PGDx will provide insight about the Fan's speed in percentage range as follows:

- Green: Exhaust fan speed is below 30%.
- Yellow: Exhaust fan speed is from 30%-100%.
- Red: Exhaust fan failed to start, or the duct temperature reached 170˚F, or the failed signal received from DI1. The system will activate the Buzzer in these situations. The Buzzer can be silenced by tapping Acknowledge the alarm on the screen.

An Alarm list is shown below:

Name
Al_cpCO_OffLine
Alarm1
Duct_HiTemp
Duct_Temp_Hw_Alrm
Room_Temp_Hw_Alrm
Room_Hum_Hw_Alrm
Exhst1_Ch_Hw_Alrm
Exhst2_Ch_Hw_Alrm
Exhst3_Ch_Hw_Alrm
Exhst4_Ch_Hw_Alrm
Spply1_Ch_Hw_Alrm
Spply3_Ch_Hw_Alrm
Spply4_Ch_Hw_Alrm
Spply2_Ch_Hw_Alrm
Exhst1_Fail_Alarm
Exhst4_Fail_Alarm
Exhst3_Fail_Alarm
Exhst2_Fail_Alarm
Spply1_Fail_Alarm
Spply4_Fail_Alarm
Spply2_Fail_Alarm
Spply3_Fail_Alarm

Screen Saver

When the controller detects a period 30 seconds of inactivity, the system will activate the Screen Saver mode and display either a green or yellow image depending on the Exhaust Fan speed. The screen shows a green leaf when the fan speed is from 0% – 30% and a yellow leaf from 31% – 100%.

Screen Saver Display Image

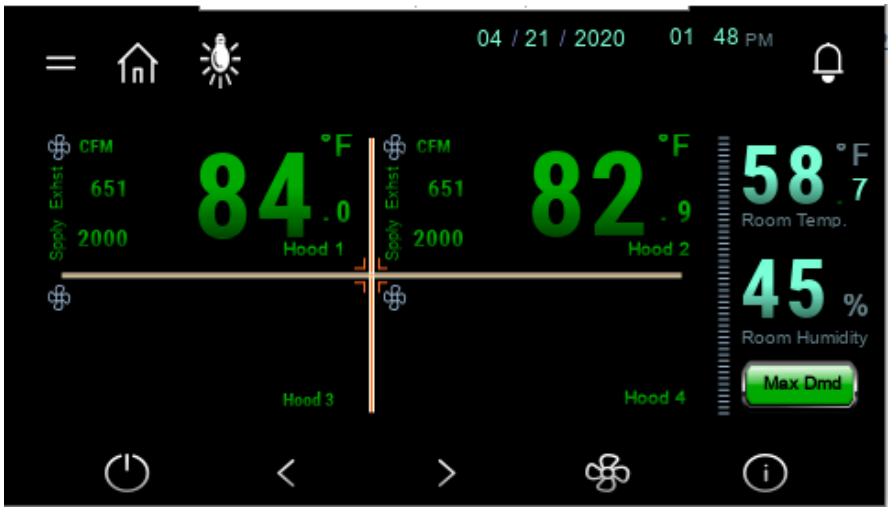
Homepage Screen

This screen will display the Zone temperatures, fan flow rate, room temperature, room humidity, and the Max Demand momentary Pushbutton.

It is depended on the selected Models that some Zones can be hidden on this screen.

The Room Temperature and Humidity are shown on the right side of the screen.

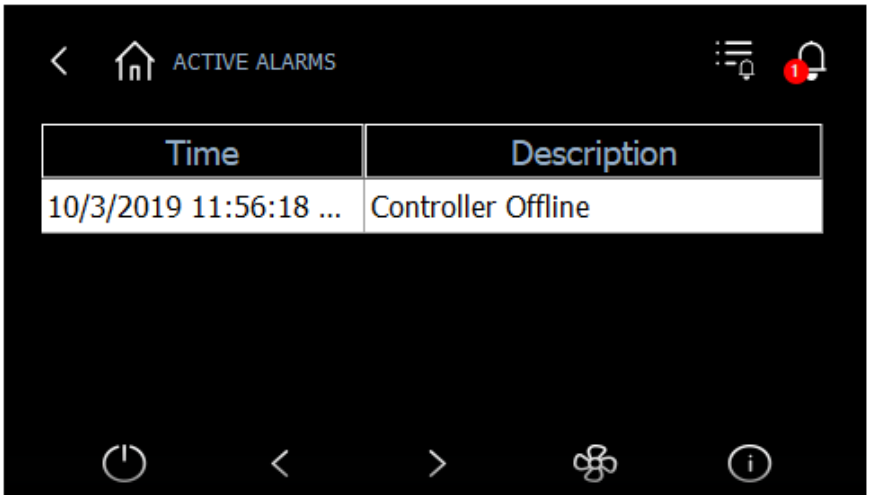
Notice that Icons layout at the top and bottom of Home screen will also show on all info pages.



Homepage

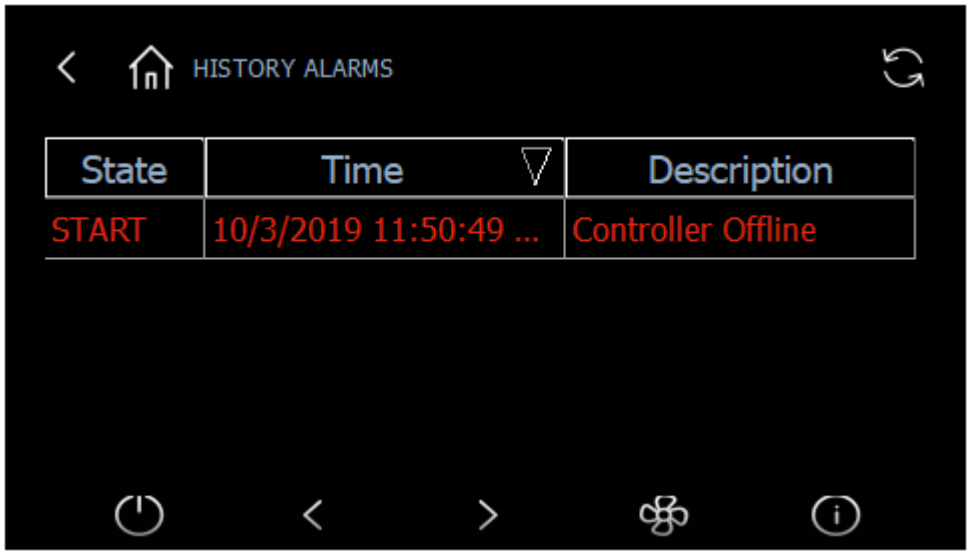
Alarm and History Alarm Pages

Users can access to the Alarm page any time by tapping the Bell Icon located on the upper right of the screen. A current active alarm page is shown below.



Alarm Page

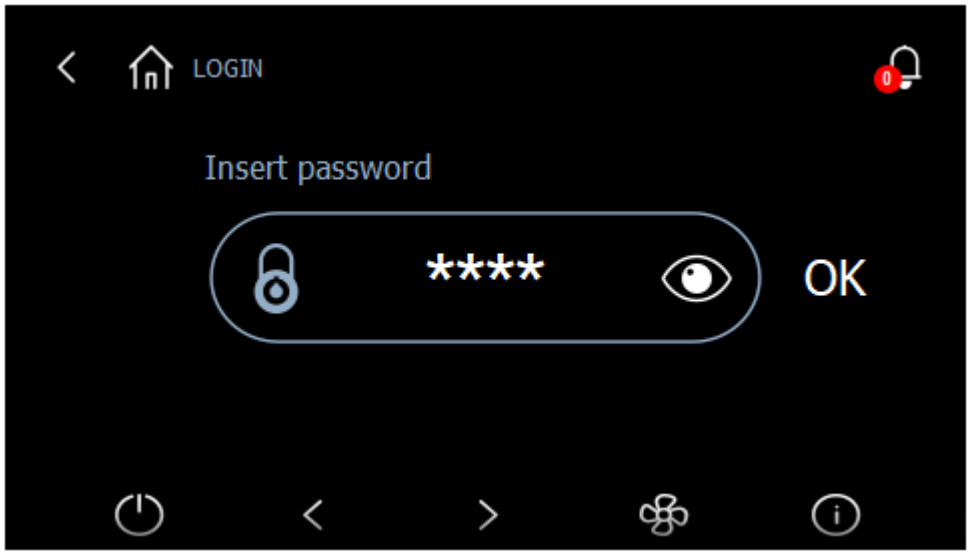
To view the Alarm History page, a User can simply tap on the small bell Icon located to the right of the first one. A History Alarm page is shown below.



History Alarm Page

Password Login Page

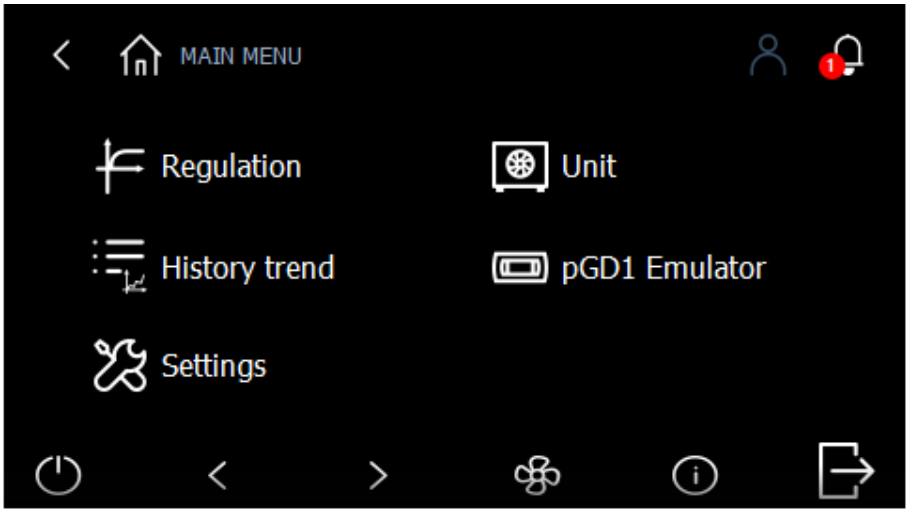
To make any changes to a process Setpoint, a User must provide a correct password. A Login page is shown in the picture below. To get to this page, tap the "=" sign next to the Home icon.



Login Page

Main Menu Page

Once a User has successfully logged in, they can now make changes to the Setpoint, Device's configuration, etc. The password type determines whether the system will allow a User to access certain areas of the Settings.



Main Menu Page

ON/OFF Page

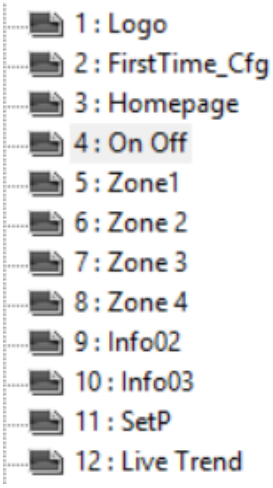
Tap on the Power Icon located at the bottom left to bring up the On/Off page.

The On/Off page allows the User to logically terminate the Controller's process. By pressing the Off button, the Controller will be in Idle state and will not process anything until the On button is pressed. Get to this page by pressing the Power icon in the middle of the bottom page.

Unit On/Off Page

Left and Right Arrow Buttons

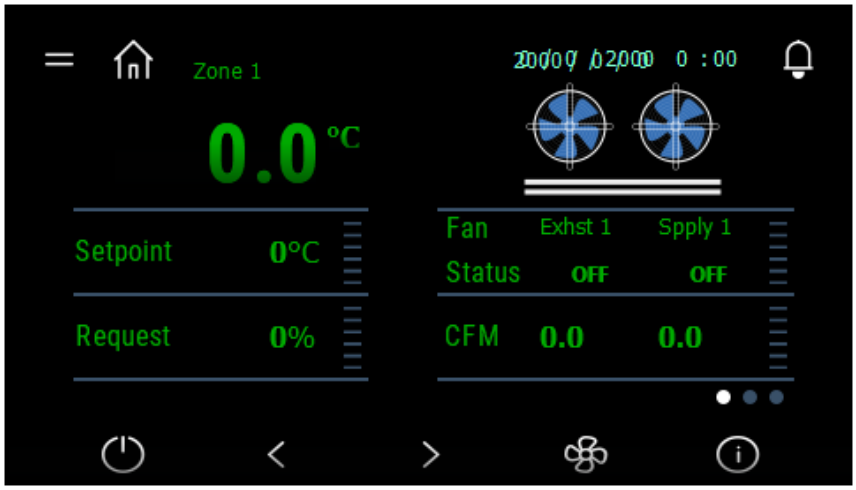
The Left and Right Arrow buttons are used to navigate back and forth from the current viewing page in the order shown in the picture below. *E.g.*, if a user is currently on Zone 4 page, pressing the Right arrow will load the Info02 page, and pressing the Left arrow will load the Zone 3 page.



Info Page Structure

Zone Status Page

Tapping on the Fan icon will take the user to the Zone 1 Info page. The Zone 1 info page is shown in the picture below. There will be one page for each enabled Zone. Depending on the system configuration, only zones that were configured to be used for that specific system will show on the status page.



Zone 1 Info Page

Controller's Info Page

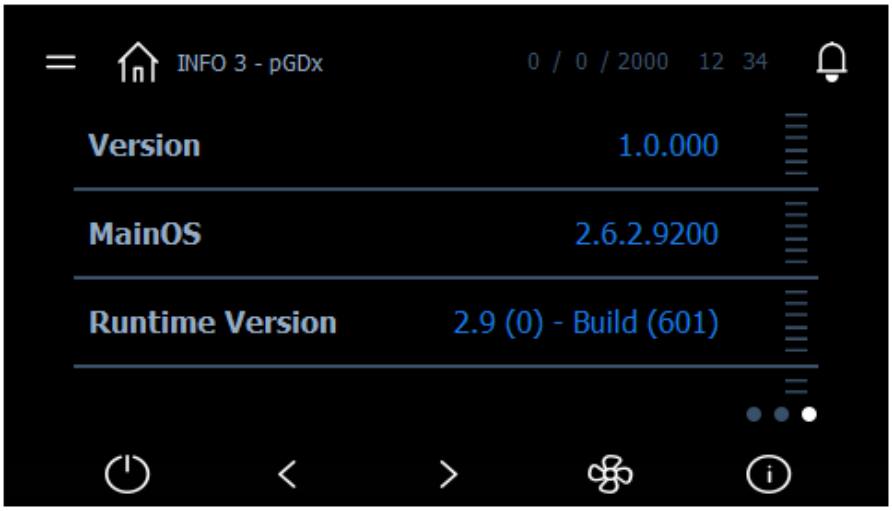
By tapping on the "i" symbol Icon, the system will bring up the Controller's hardware information page.

The Controller's Info page shows the information about the Controller's OS version, processor type, etc. This screen is subsequent to the one above. Get to this page by tapping on the Right-Arrow located on the right side of the enabled Zone page.

Controller's Info Page

Controller's Info Page

Similar to the Controller page, a PGDx Info page is shown below. This screen contains all the information that relates to the PGDx. This screen is subsequent to the screen above.

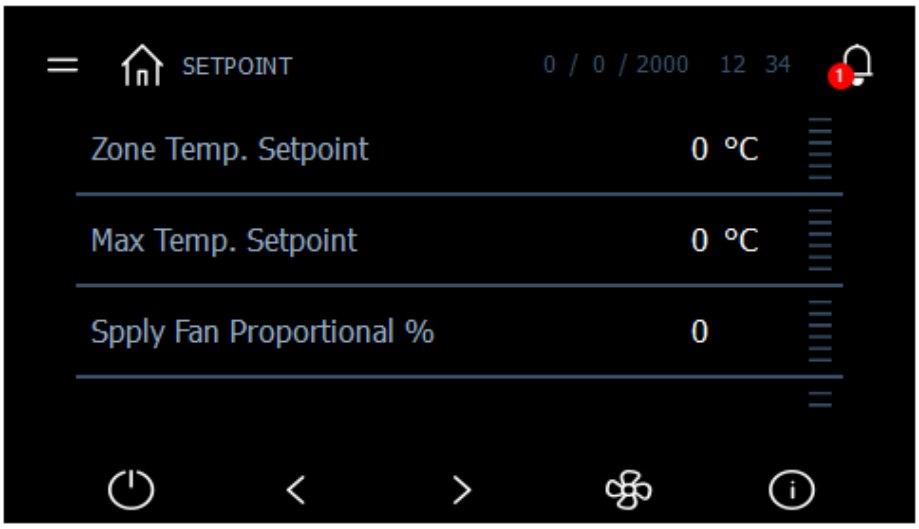


PGDx's Info Page

Setpoint Status Page

Tapping on the Temperature symbol button leads the User to the Setpoint Status page. Any other Setpoint screen will be subsequent to this one.

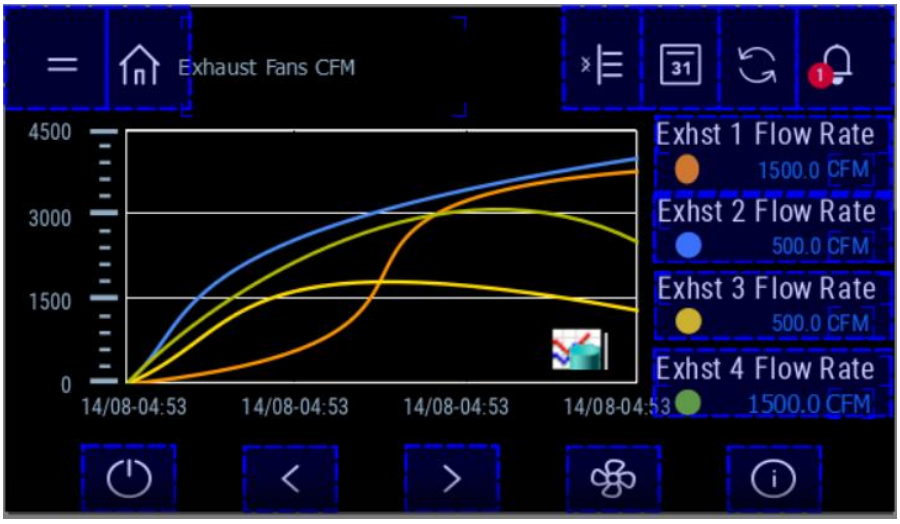
The Setpoint Status pages contain all the System's process Setpoints such as Zone temperatures, Exhaust and Supply fan speeds, etc.



Setpoint Status Page

Live Trending Page

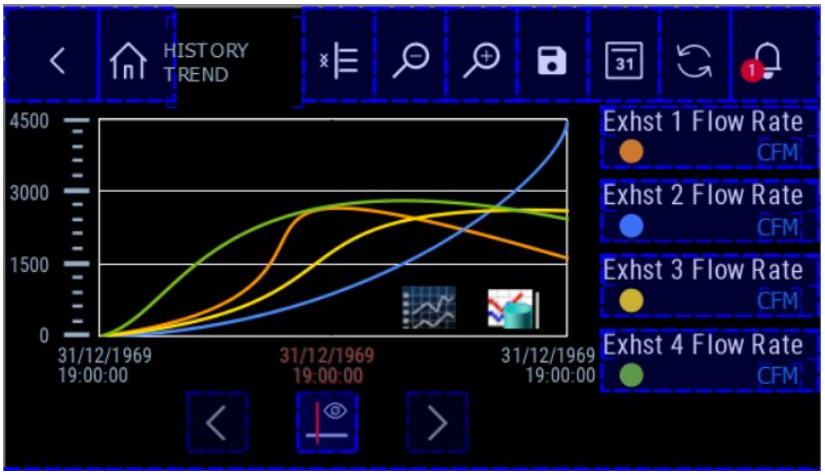
The Trending page displays all the Exhaust fan flow rates. Three buttons on the upper left window are used to configure the layout of the Trending window. Each button on the right window is used to control the show/hide of each cursor.



Fan Flow Rate Trending

History Trending Page

The History Trending page shows the graphs of all the Exhaust fan flow rates. From this page, a user can also export the trending history into a log file which can be saved into a local PGDx drive or a usb stick.

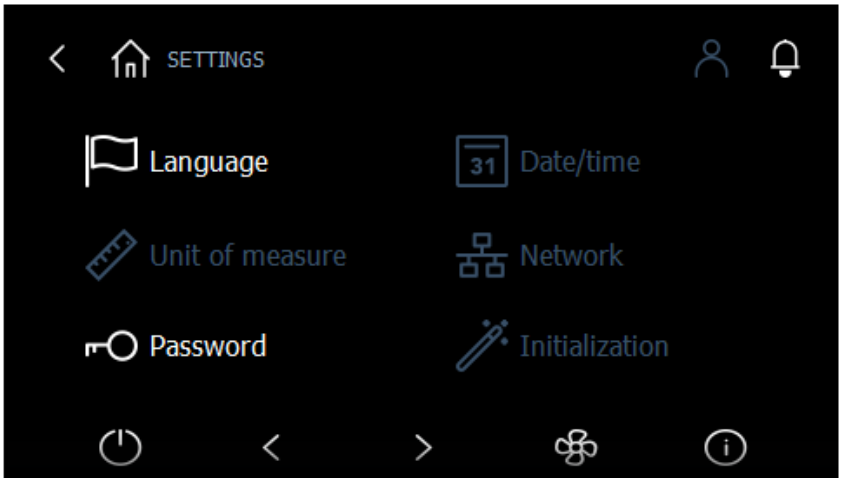


Fan Flow Rate History Trending

Password Protected Page

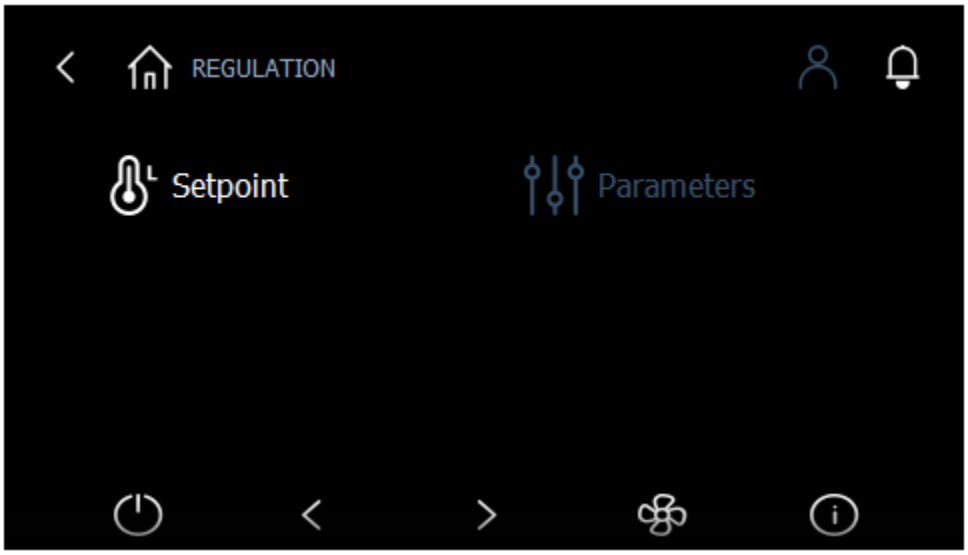
As mentioned above, the system only allows the User to get to certain pages depending on the password types. An example is shown in a picture below. A setting page at the User level password type allows a User to change the System's display language, modify Date & Time, and change the new User password, but not the Unit of measurement, configure the serial port, or initialize the system.

From the Main Menu page tap Settings to get to this system Settings page.



User Level Password Setting Page

The regulation page has two options, Setpoint and Parameters. To navigate to this page, a User can tap on Regulation from the Main Menu page.



Regulation Page

Setpoint

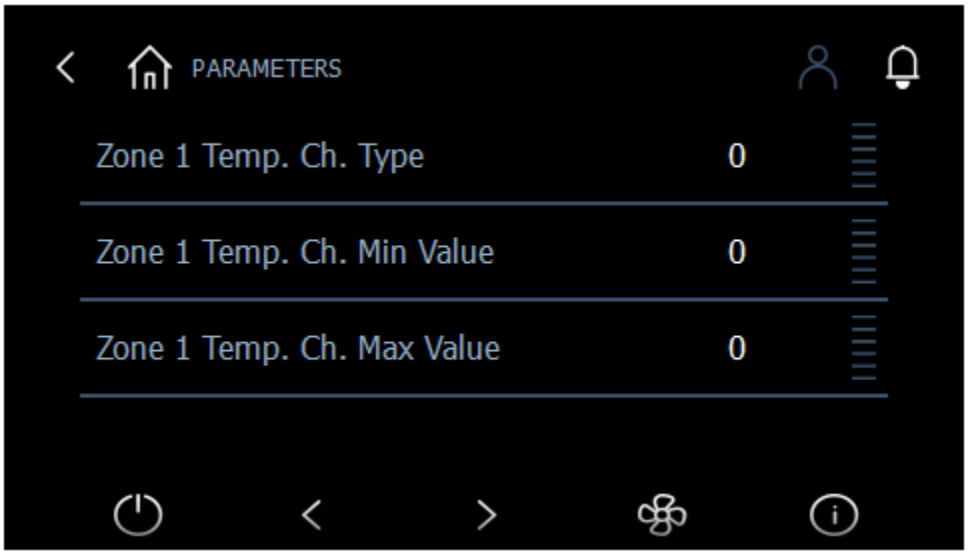
Zone Temperature Setpoint is shown in the picture below. From here, a User can set the temperatures for all the zones. The Max Temp. Setpoint allows a User to set the temperature at which the exhaust fan(s) speed will be at 100%.

To get to this page, just tap Setpoint from the Regulation page showed above.

Process Setpoint Page

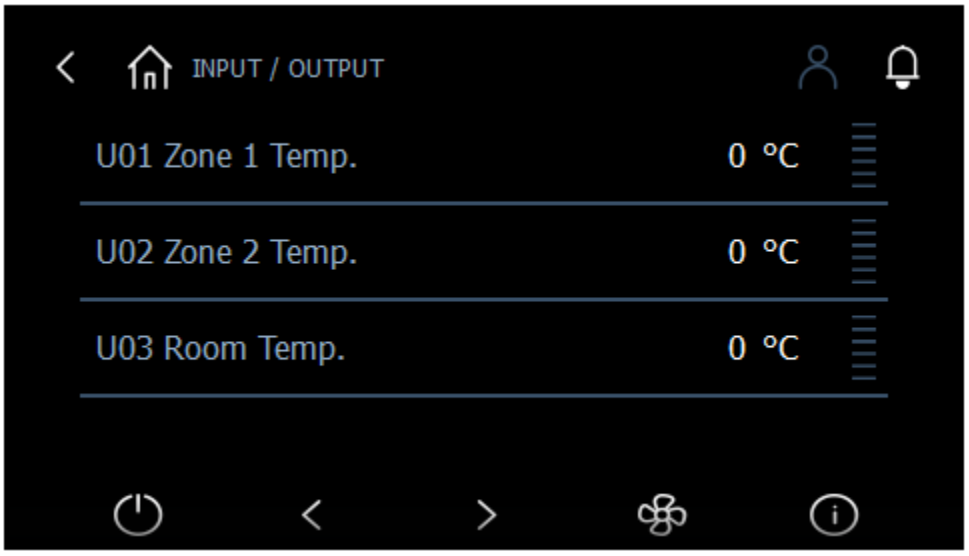
Parameters

The Parameter page is where a User can set the sensor types, Min and Max values, and an Offset value for each analog input channel. Tap Parameters from the Regulation page to get to this page.



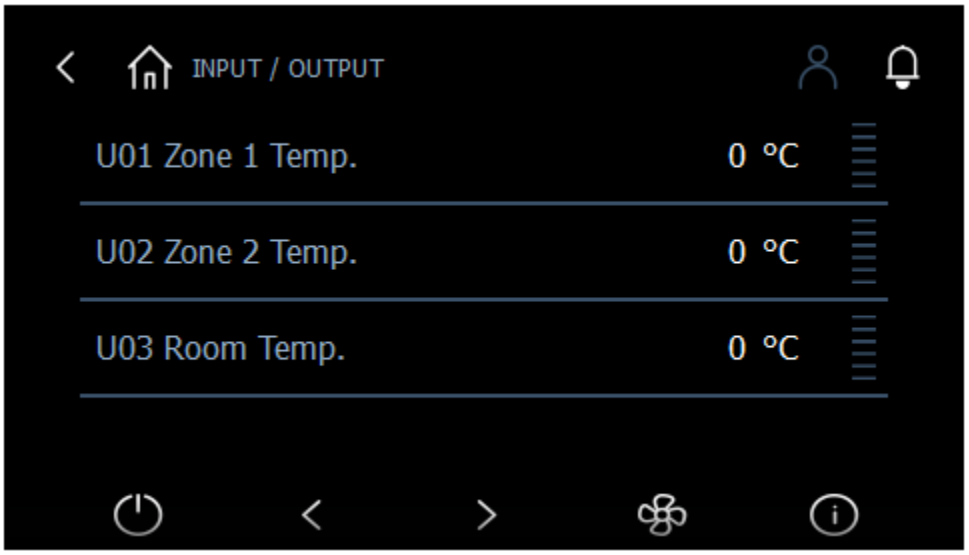
Parameters Page

Unit Configuration



Unit Setting Page

The Unit Configuration page contains the IO Tab that will allow a User to set all the IO channel number by tapping Input/Output.



Input Output Page

System Date and Time

Finally, the last status page of the system that doesn't require a password to access is the Date & Time. Get to this page by pressing the bottom right Icon.

Date & Time Page

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TERMS AND CONDITIONS OF SALE

THESE TERMS AND CONDITIONS OF SALE ("*TERMS*") CONTAIN VERY IMPORTANT INFORMATION REGARDING YOUR PURCHASE, AS WELL AS CONDITIONS, LIMITATIONS, AND EXCLUSIONS THAT APPLY TO YOU AND YOUR PURCHASE. PLEASE READ THEM CAREFULLY. YOUR PURCHASE IS EXPRESSLY LIMITED TO AND MADE CONDITIONAL UPON THE EXCLUSIVITY OF THESE TERMS. ANY PROPOSAL FOR DIFFERENT TERMS OR ANY ATTEMPT TO VARY, IN ANY DEGREE, ANY OF THESE TERMS IS EXPRESSLY REJECTED.

1. **Acceptance.** These Terms govern any purchase made from North American Kitchen Solutions, Inc. ("***North American Kitchen Solutions***"). These Terms, the Manual in which they are contained, installation and maintenance instructions, the applicable invoice, and any documents incorporated or referred to herein or therein, including any future paper or electronic releases issued by North American Kitchen Solutions, constitute the "Order." The Order is the entire contract between you, the buyer, and North American Kitchen Solutions, the seller, for products purchased from North American Kitchen Solutions. These Terms apply to the Order unless expressly modified or waived in writing by an officer of North American Kitchen Solutions. An Order may only be cancelled by you upon payment of reasonable cancellation charges for expenses incurred or commitments made by North American Kitchen Solutions. Captions in these Terms are for convenience only.

2. **Pricing.** The price for North American Kitchen Solutions' goods, material, equipment, or items ("***Products***") is complete, and no deductions, credits, or offsets may be made without North American Kitchen Solutions' express written consent. Prices are subject to change and surcharges in the event of cost increases in materials and transportation. All complete component accessory material manufactured by others and furnished with Products such as motors, drives, vibration equipment, controls, or other completely assembled component structures, are subject to adjustment to the price at time of shipment regardless of the date of original order entry.

3. **Sales and Similar Taxes.** North American Kitchen Solutions' prices do not include sales, use, excise, or similar taxes. Present or future sales, use, excise, or other similar tax applicable to the sale of Products shall be paid you, unless an acceptable tax exemption certificate is provided to North American Kitchen Solutions.

4. **Payment.** North American Kitchen Solutions reserves the right to require full or partial payment in advance of any order. Pro rata payments are due as shipments are made. Each shipment or delivery shall constitute a separate sale, and the default of any shipment or delivery shall constitute a separate sale, and the default of any shipment or delivery shall not vitiate the contract as to other shipments or deliveries.

5. **Delivery.** Shipping and delivery dates are estimates only. No delay in delivery will subject North American Kitchen Solutions to any costs, damages or fees for late delivery. Delivery of Products is made F.O.B. point of shipment, unless otherwise stated. North American Kitchen Solutions shall not be liable for delay due to causes beyond its reasonable control (i.e., force majeure events). In the event of such a delay, the date of delivery shall be extended for a period equal to the time lost by reason of the delay.

6. **Changes**. North American Kitchen Solutions may make changes, including improvements and additions, in the technical requirements, specifications, designs, materials, packaging, and place of delivery, method of transportation, quantities, or delivery schedules of the Products by notifying you.

7. **Safety.** The Products may be designed to serve multiple applications. North American Kitchen Solutions offers a range of safety equipment, including guards and other devices, as may be required to meet customer specifications. Without exception, North American Kitchen Solutions recommends that all orders include applicable safety devices. Use of Products ordered without applicable safety devices are your sole responsibility. You warrant that you have determined and acquired any and all safety devices

required for the Products. Weather covers and guards for motor and V-belt drives, couplings, shafts and bearings, along with inlet and outlet screens, are optional accessories noted in the price list.

8. **Title.** Title and right of possession of Products remains with North American Kitchen Solutions until all payments (including deferred payments whether evidenced by notes or otherwise) shall have been received to the satisfaction of North American Kitchen Solutions and you agree to do all acts necessary to perfect and maintain such title and right in North American Kitchen Solutions and not to subject any Products to any liens or encumbrances until such payment is made in full.

9. **Governing Law**. This Order shall be governed by and construed according to the laws of the State of Ohio (excluding the conflict of law provisions thereof). At North American Kitchen Solutions' discretion, any action relating directly or indirectly to the Order shall be brought exclusively in the Common Pleas Court of Cuyahoga County, Ohio or the United States District Court for the Northern District of Ohio, Eastern Division, and you irrevocably waive any objection to the jurisdiction of, or venue in, either of these courts and agree that the acceptance of the Order constitutes doing business in the State of Ohio.

10. **Arbitration.** At North American Kitchen Solutions' discretion, any dispute arising under or in connection with any Order may be submitted to binding arbitration administered by the American Arbitration Association under its Commercial Arbitration Rules, and judgment on the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The dispute shall be resolved by one neutral arbitrator who shall have no affiliation with either you as the buyer or with North American Kitchen Solutions and shall be selected by the American Arbitration Association office, and held in, Cleveland, Ohio.

WARNING. North American Kitchen Solutions' Products are designed and manufactured to provide reliable performance but they are not guaranteed to be 100% free of defects. Even reliable products will experience occasional failures and this possibility should be recognized by the buyer and all end users. If Products are used in life support ventilation systems where failure could result in loss or injury, the buyer and all end users should provide adequate backup ventilation, supplementary natural ventilation or failure alarm system, or acknowledge willingness to accept the risk of such loss or injury. **DO NOT USE IN HAZARDOUS ENVIRONMENTS** where a fan's electrical system could provide ignition to combustible or flammable materials unless unit is specifically built for hazardous environments. Comply with all local and national safety codes including the National Electrical Code (NEC) and National Fire Protection Act (NFPA).

CAUTION. Guards must be installed when fan is within reach of personnel or within eight (8) feet (2.5 m) of working level or when deemed advisable for safety.

DISCLAIMER. North American Kitchen Solutions has made a diligent effort to illustrate and describe the Products accurately in all materials; however, such illustrations and descriptions are for the sole purpose of identification and do not express or imply any warranty.